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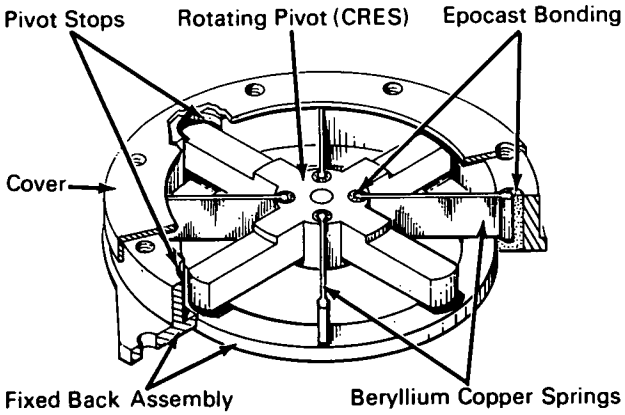
NASA TECH BRIEF

Flexible Pivot Mount Eliminates Friction and Hysteresis

The problem:

The ultimate pointing accuracy of telescopes, transits, radar antennas, and laser ranging systems which use gimbal control systems depends largely upon the inherent sources of error—pivot friction and hysteresis—that orginate in the gimbal mounts.



The solution:

A flexible pivot mount, suspended by flat vertical springs, rotates through extremely small angles (see fig.). The mount rotation, which is linearly proportional to torque is smooth, free of hysteresis, and starting friction. No lubrication is required anywhere in the mount assembly.

How it's done:

The steel pivot mount is supported by beryllium copper springs which are attached to the outer fixed frame. Mechanical stops are provided to limit the thrust load on the springs. The flexure spring constant is approximately 4 ft-lb/radian. Recently, pivot mounts with adjustable spring constants have been developed and incorporated in a solar observation telescope that has a pointing accuracy of 0.2 arc second.

The flexible pivot mount can be made in many different sizes; it can be driven with a dc torque motor or a mechanical linkage. In general, the mount can be used in any application requiring small rotary motion with zero chatter.

An interesting potential application would be a flexible pivot mount support by springs with different thermal expansion coefficients. Heat (optical energy) applied to one spring segment would produce an angular rotation independent of any external drive system.

Note:

Requests for further information may be directed to:

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Reference: B70-10577

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: C. O. Highman of
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Category 07